IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Handschuh

Serial Number: 10/075,281

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Examiner: Gartenberg

Group Art Unit: 3746

Attorney Docket No.: ARL 01-12

Title: APPARATUS FOR REDUCING COKING IN GAS TURBINE BEARINGS

APPEAL BRIEF
FILED UNDER 37 C.F.R. 1.192

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

This appeal is being filed in response to the Final Rejection dated October 9, 2003 of claims 8 through 15 as set forth in the Appendix. The following is being provided as required in 37 C.F.R. 1.192(c):

1. Real Party In Interest: The real party in interest is the Army Materiel Command, U.S. Department of the Army, U.S. Government.

2. Related Appeals And Interferences: There are no related appeals or interferences that have been filed.

3. Status Of Claims: Claims 1 through 7 have been cancelled, and claims 8 through 15, which are pending in the application, are the claims being appealed.

4. Status Of Amendments: No amendments have been filed subsequent to the Final Rejection of October 9, 2003.

5. Summary Of The Invention:

The invention is an apparatus for minimizing coking in the bearing assemblies of a turbine comprising a lubricant reservoir, first and second lubricant supply lines extending from the lubricant reservoir to each of the bearings, and a main pump connected to the first lubricant supply lines for supplying the lubricant to the bearings when the turbine is operating. An auxiliary pump is connected to the second lubricant supply line for supplying lubricant to the bearings, and a control means is connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off. A lubricant return line is connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir. Temperature sensors are connected to the lubricant return line and the control means for measuring the temperature of the lubricant in the lubricant return line. The control means turns off the auxiliary pump when the temperature of the lubricant in the lubricant return line falls below a predetermined temperature.

6. Issues For Appeal:

a. Whether claims 8-15 are unpatentable under 35 U.S.C. 102(b) as being anticipated by Guest (U.S. Patent No. 4,309,870).

b. Whether claims 8-15 are unpatentable under 35 U.S.C. 103(a) as being obvious in view of Guest (U.S. Patent No. 4,309,870).

7. Grouping Of The Claims (for each ground of rejection):

a. Rejection of claims 8 through 15 under 35 U.S.C. 102(b). The claims have been grouped together.

Claims 8 through 15 relate to an apparatus for minimizing the coking in the bearings of a turbine by activating an auxiliary pump to supply lubricant to turbine bearings when the turbine is shut off. Claims 10 recites that temperature sensors are connected to the lubricant return line extending from the bearings to the reservoir for shutting off the auxiliary pump when the lubricant temperature falls below a predetermined temperature. Claim 15 recites that the first and second lubricant supply lines each include one way valve means for allowing the lubricant to flow only from the lubricant reservoir to the bearings.

Claims 14 relates to an apparatus for minimizing coking in bearings of a turbine having a main pump for supplying lubricant to the bearings through a first supply conduit when the turbine is operating. An auxiliary pump is connected to a second supply conduit, which is separate and distinct from the first supply conduit, for supplying the lubricant through the second lubricant supply conduit to the bearings. A control means is connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off and temperature sensors are connected to a lubricant return conduit for measuring the temperature of the lubricant. The control means is connected to the temperature sensors and the auxiliary pump for turning off the auxiliary pump when

the temperature of the lubricant in the lubricant return conduit falls below a predetermined temperature.

b. Rejection of claims 8 through 15 under 35 U.S.C. 103(a). The claims have been grouped together.

Claims 8 through 15 relate to an apparatus for minimizing the coking in the bearings of a turbine by activating an auxiliary pump to supply lubricant to turbine bearings when the turbine is shut off. Claims 10 recites that temperature sensors are connected to the lubricant return line extending from the bearings to the reservoir for shutting off the auxiliary pump when the lubricant temperature falls below a predetermined temperature. Claim 15 recites that the first and second lubricant supply lines each include one way valve means for allowing the lubricant to flow only from the lubricant reservoir to the bearings.

Claims 14 relates to an apparatus for minimizing coking in bearings of a turbine having a main pump for supplying lubricant to the bearings through a first supply conduit when the turbine is operating. An auxiliary pump is connected to a second supply conduit, which is separate and distinct from the first supply conduit, for supplying the lubricant through the second lubricant supply conduit to the bearings. A control means is connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off and temperature sensors are connected to a lubricant return conduit for measuring the temperature of the lubricant. The control means is connected to the temperature sensors and the auxiliary pump for turning off the auxiliary pump when the temperature of the lubricant in the lubricant return conduit falls below a predetermined temperature.

8. Arguments

a. Whether claims 8-15 are unpatentable under 35 U.S.C. 102(b) as being anticipated by Guest (U.S. Patent No. 4,309,870).

Claims 8-15 relate to an apparatus for minimizing the coking in bearings of a turbine, including a lubricant reservoir, first and second lubricant supply lines extending from the lubricant reservoir to the turbine bearings, and a main pump connected to the first lubricant supply line for supplying the lubricant to the bearings. The apparatus further includes an auxiliary pump connected to the second lubricant supply line for supplying the lubricant to the bearings, and a control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off, to continue the supply of lubricant to the bearings to prevent potential coking conditions in the bearings when the turbine is turned off. Temperature sensors are connected to the control means and the lubricant return conduit for measuring the temperature of the lubricant in the lubricant return conduit and for turning off the auxiliary pump when the temperature of the lubricant in the lubricant return conduit drops below a predetermined temperature.

The examiner argued that:

"Claims 8-15 are rejected under 35 USC 102(b) as anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Guest 4,309,870, that teaches that invention as disclosed and as claimed: An apparatus for minimizing coking in bearings of a turbine comprising: a lubricant reservoir 26, first and second lubricant lines 22, 32 form tank to bearings ("various stations"), a gas-turbine operated main pump 20 on line 22, an auxiliary electrical pump 30 on line 32, control means for activating the auxiliary pump

when the turbine is turned off (col. 3, ll. 35-37), temperature sensors 54, 56 on the return lines of the pumps, a one way valve 24 on the first line, and a one way valve on the second line (un-numbered). This rejection is a 35 USC 102(b)/35 USC 103(a) rejection because Guest is silent regarding the type of the un-numbered valve on l. 32, although Guest uses the same symbol as the symbol used by Applicant for his one-way valves 30, 40, 56, 66. However, even if Guest is silent about said valve type, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to make said un-numbered valve a one-way in order to prevent flow of oil from pump 20 into pump 30, because the purpose of the system was to lubricate the bearings of the gas turbine, and not to pump oil through inactive pump 30. Also note, that the placement of the temperature sensors 54, 56 on the return line would have been an obvious placement of said sensors, because it was on the return lines that the temperature of the oil was maximal, and it was therefore in said location that the danger for oil coking and the need to prevent it that was maximal"

In response to the examiners rejection under 35 USC 102(b) reference should initially begin with the examiners own statement from above: "This rejection is a 35 USC 102(b)/35 USC 103(a) rejection because Guest is silent regarding the type of the un-numbered valve on l. 32, although Guest uses the same symbol as the symbol used by Applicant for his one-way valves 30, 40, 56, 66. However, even if Guest is silent about said valve type, it would have been obvious to one of ordinary skill in the art". The examiner appears to suggest that the 35 USC 102(b) rejection is not proper. If this is the case then it should have never been proposed by the examiner. Beyond this, the examiner has miscast the words of the claims to fit the disclosure of Guest. For example, he

indicates that there are "temperature sensors 54, 56 on the return lines of the pumps"; but this is not accurate because the claims recite (claim 9 a lubricant return line connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir; and claim 10 recites the apparatus of claim 9 where the temperature sensors are connected to the lubricant return line....). The temperature sensors 54, 56 the examiner refers to are not on lubricant return lines from any bearings, but are from the outlet of pump 20. Figures 1 or 2 do not appear to show any lubricant return lines from the bearings. In Guest, as understood, pump 20 is driven by the turbine 12 to draw lubricant from the reservoir 26 through an inlet line 22 and the lubricant flows from the pump through line 24, then through check valve 25 onto a horizontal line 34 shown in Figure 1 where the phrase "To The Stations" is presumed to indicate bearings (Guest, col. 2, lines 44-51). Further, valve 36 is activated to allow overheated lubricant in line 24 to return to the reservoir 26 instead of being sent to the bearings.

This leads to another miscasting of the Guest reference in the examiners arguments: "Also note, that the placement of the temperature sensors 54, 56 on the return line would have been an obvious placement of said sensors". As noted above this does not appear to be a factually correct application of Guest; but further, the purposes and teachings for use of sensors for the present application are contrary and different. In the present application the temperature sensors are used to turn off the auxiliary pump when the lubricant temperature falls below a predetermined level while the sensors in Guest are activated when the lubricant temperature rises above a predetermined level.

Further, the examiner contends that Guest discloses a "control means for activating the auxiliary pump when the turbine is turned off (col. 3, ll35-37)". Claim 8,

for example, recites a control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off. Column 3 of Guest further discloses that the auxiliary or stand-by pump 30 is activated when temperature sensitive switch 54 senses that the temperature of the lubricating oil at the outlet of pump 20 has exceeded a predetermined level (col. 3, lines 58-68). While Guest does disclose an additional way to turn on pump 30; that the auxiliary motor 42/pump 30 will be energized when the rotational speed of the pump 20 or turbomachine drops below a predetermined level (col. 4, ll12-20), there does not appear to suggest the activation of an auxiliary pump upon a particular event, i.e., when the turbine is turned off.

Since the applied reference of record does not disclose all of the claimed features of the invention, claims 8 through 15 are considered allowable.

b. Whether claims 8-15 are unpatentable under 35 U.S.C. 103(a) as being obvious in view of Guest (U.S. Patent No. 4,309,870).

As described above, claims 8-15 relate to an apparatus for minimizing the coking in bearings of a turbine, including a lubricant reservoir, first and second lubricant supply lines extending from the lubricant reservoir to the turbine bearings, and a main pump connected to the first lubricant supply line for supplying the lubricant to the bearings. The apparatus further includes an auxiliary pump connected to the second lubricant supply line for supplying the lubricant to the bearings, and a control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off, to continue the supply of lubricant to the bearings to prevent potential coking conditions in the bearings when the turbine is turned off. Temperature sensors are

connected to the control means and the lubricant return conduit for measuring the temperature of the lubricant in the lubricant return conduit and for turning off the auxiliary pump when the temperature of the lubricant in the lubricant return conduit drops below a predetermined temperature.

The examiner argued that claims 8-15 are rejected under 35 USC 103(a): "as obvious over Guest 4,309,870, that teaches that invention as disclosed and as claimed: An apparatus for minimizing coking in bearings of a turbine comprising: a lubricant reservoir 26, first and second lubricant lines 22, 32 form tank to bearings ("various stations"), a gas-turbine operated main pump 20 on line 22, an auxiliary electrical pump 30 on line 32, control means for activating the auxiliary pump when the turbine is turned off (col. 3, ll. 35-37), temperature sensors 54, 56 on the return lines of the pumps, a one way valve 24 on the first line, and a one way valve on the second line (un-numbered). This rejection is a 35 USC 102(b)/35 USC 103(a) rejection because Guest is silent regarding the type of the un-numbered valve on l. 32, although Guest uses the same symbol as the symbol used by Applicant for his one-way valves 30, 40, 56, 66. However, even if Guest is silent about said valve type, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to make said un-numbered valve a one-way in order to prevent flow of oil from pump 20 into pump 30, because the purpose of the system was to lubricate the bearings of the gas turbine, and not to pump oil through inactive pump 30. Also note, that the placement of the temperature sensors 54, 56 on the return line would have been an obvious placement of said sensors, because it was on the return lines that the temperature of the oil was maximal, and it was therefore

in said location that the danger for oil coking and the need to prevent it that was maximal"

The examiner has miscast the words of the claims to fit the disclosure of Guest. For example, he indicates that there are "temperature sensors 54, 56 on the return lines of the pumps"; but this is not accurate because the claims recite (claim 9 a lubricant return line connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir; and claim 10 recites the apparatus of claim 9 where the temperature sensors are connected to the lubricant return line....). The temperature sensors 54, 56 the examiner refers to are not on lubricant return lines from any bearings, but are from the outlet of pump 20. Figures 1 or 2 do not appear to show any lubricant return lines from the bearings. In Guest, as understood, pump 20 is driven by the turbine 12 to draw lubricant from the reservoir 26 through an inlet line 22 and the lubricant flows from the pump through line 24, then through check valve 25 onto a horizontal line 34 shown in Figure 1 where the phrase "To The Stations" is presumed to indicate bearings (Guest, col. 2, lines 44-51). Further, valve 36 is activated to allow overheated lubricant in line 24 to return to the reservoir 26 instead of being sent to the bearings.

This leads to another miscasting of the Guest reference in the examiners arguments: "Also note, that the placement of the temperature sensors 54, 56 on the return line would have been an obvious placement of said sensors". As noted above this does not appear to be a factually correct interpretation of Guest; but further, the purposes and teachings for use of sensors for the present application are contrary and different. In the present application the temperature sensors are used to turn off the auxiliary pump when

the lubricant temperature falls below a predetermined level while the sensors in Guest are activated when the lubricant temperature rises above a predetermined level.

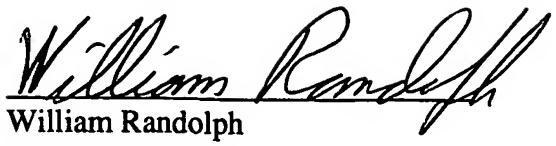
Further, the examiner contends that Guest discloses a "control means for activating the auxiliary pump when the turbine is turned off (col. 3, ll 35-37)". Claim 8, for example, recites a control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off. Column 3 of Guest further discloses that the auxiliary or stand-by pump 30 is activated when temperature sensitive switch 54 senses that the temperature of the lubricating oil at the outlet of pump 20 has exceeded a predetermined level (col. 3, lines 58-68). While Guest does disclose an additional way to turn on pump 30; that the auxiliary motor 42/pump 30 will be energized when the rotational speed of the pump 20 or turbomachine drops below a predetermined level (col. 4, ll12-20), there does not appear to suggest the activation of an auxiliary pump upon a particular event, i.e., when the turbine is turned off.

Since the applied reference of record does not suggest or teach all of the claimed features of the invention, claims 8 through 15 are considered allowable.

It is noted that the Final Office action contained an Interview Summary sheet; however it was unclear if there was a response factor since it was not signed, not indicated as an attachment (see attachment 4) on the Office Action Summary, and the examiner precipitated the "interview".

Any costs incident with the filing of this Appeal should be charged to the U.S. Army Materiel Command Patent Office deposit account number **19-2201.** Any deficiency or overpayment should be charged or credited to this numbered deposit account.

March 9, 2004



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APPENDIX:

Claims 8 through 15 are Appealed.

Claim 8. Apparatus for minimizing coking in bearings of a turbine, comprising:

a lubricant reservoir containing a lubricant;

first and second lubricant supply lines extending from the lubricant reservoir and connected to each of the bearings;

a main pump connected to the first lubricant supply line for supplying the lubricant through the first lubricant supply line to the bearings, when the turbine is operating;

an auxiliary pump connected to the second lubricant supply line for supplying the lubricant through the second lubricant supply line to the bearings; and

control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off and for supplying lubricant to the bearings.

Claim 9. The apparatus of claim 8, further comprising:

a lubricant return line connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir.

Claim 10. The apparatus of claim 9, further comprising:

temperature sensors connected to the lubricant return line and the control means for measuring the temperature of the lubricant in the lubricant return line, and the control means turning off the auxiliary pump when the temperature of the lubricant in the lubricant return line falls below a predetermined temperature.

Claim 11. The apparatus of claim 8, wherein the first and second lubricant supply lines are separate and spaced from each other.

Claim 12. The apparatus of claim 8, wherein the first and second lubricant supply lines are separate and distinct from each other.

Claim 13. The apparatus of claim 8, wherein the first and second lubricant supply lines each include one way valve means for allowing the lubricant to flow only from the lubricant reservoir to the bearings.

Claim 14. Apparatus for minimizing coking in bearings of a turbine, comprising:

a lubricant reservoir containing a lubricant;

first and second lubricant supply conduits extending from the lubricant reservoir and connected to the turbine bearings, wherein the first and second conduits are separate from each other;

a main pump connected to the first lubricant supply conduit for supplying lubricant through the first lubricant supply conduit to the bearings, when the turbine is operating;

an auxiliary pump connected to the second lubricant supply conduit for supplying the lubricant through the second lubricant supply conduit to the bearings;

control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off and for supplying lubricant to the bearings;

a lubricant return conduit connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir; and

temperature sensors connected to the lubricant return conduit for measuring the temperature of the lubricant in the lubricant return conduit, and the control means further connected to the temperature sensors and the auxiliary pump for turning off the auxiliary pump when the temperature of the lubricant in the lubricant return conduit is below a predetermined temperature.

Claim 15. Apparatus for minimizing coking in bearings of a turbine, comprising:

a lubricant reservoir containing a lubricant;

first and second lubricant supply lines extending from the lubricant reservoir and connected to each of the bearings, wherein the first and second lubricant supply lines are separate and distinct from each other and wherein the first and second lubricant supply lines each include one way valve means for allowing the lubricant to flow only from the lubricant reservoir to the bearings.;

a main pump connected to the first lubricant supply line for supplying the lubricant through the first lubricant supply line to the bearings, when the turbine is operating;

an auxiliary pump connected to the second lubricant supply line for supplying the lubricant through the second lubricant supply line to the bearings;

control means connected to the turbine and the auxiliary pump for turning on the auxiliary pump when the turbine is turned off and for supplying lubricant to the bearings, and

a lubricant return line connected to the lubricant reservoir and the bearings for returning the lubricant from the bearings to the lubricant reservoir.